

(3.3) Factored Form of a Quadratic Relation

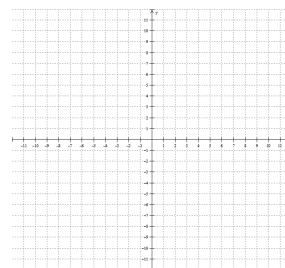
There are 3 forms of the quadratic relation:

- 1) standard form: $y = ax^2 + bx + c$
- 2) factored form: $y = a(x - r)(x - s)$
- 3) vertex form: $y = a(x - h)^2 + k$

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Ex. 1) Complete the table of values using the TI-nspire and then graph: $y = -2(x - 1)(x + 3)$.

x	y
-4	-10
-3	0
-2	6
-1	8
0	6
1	0
2	-10



Determine:

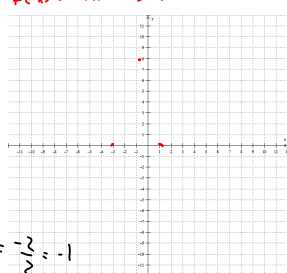
- a) Zeros: _____ e) "a" value: _____
- b) Vertex: _____ f) direction of opening: _____
- c) Y-Intercept: _____ g) optimal value: _____
- d) Axis of Symmetry: _____ h) max or min: _____

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Ex. 1) Complete the table of values using the TI-nspire and then graph: $y = -2(x - 1)(x + 3)$.

x	y
-4	-10
-3	0
-2	6
-1	8
0	6
1	0
2	-10

-2



$$\frac{-3 + 1}{2} = \frac{-2}{2} = -1$$

Determine:

- a) Zeros: 1 and -3 e) "a" value: -2
- b) Vertex: (-1, 8) f) direction of opening: down
- c) Y-Intercept: +6 g) optimal value: +8
- d) Axis of Symmetry: x = -1 h) max or min: max

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SUMMARY

Given: $y = a(x - r)(x - s)$

- a) $a > 0$ opens UP ∴ minimum
 $a < 0$ opens DOWN ∴ maximum
- b) zeros $x = r$ and $x = s$
- c) Axis of symmetry: $x = \frac{r + s}{2}$
- d) Vertex: x-coordinate \Rightarrow x from axis of symmetry
 $\Rightarrow x = \frac{r + s}{2}$
y-coordinate \Rightarrow substitute x-value into the equation to calculate y
- e) Y-Intercept: set $x = 0$ and solve.

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Ex. 2) Find the characteristics of the quadratic relation $y = 3(x - 4)(x + 2)$.

- a) direction of opening _____
- b) zeros _____
- c) axis of symmetry _____
- d) vertex _____
- e) y-intercept _____

f) Sketch using the critical points.

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Ex. 2) Find the characteristics of the quadratic relation $y = 3(x - 4)(x + 2)$.

$$y = a(x - r)(x - s)$$

$$y = 3(x - 4)(x - (-2))$$

- a) direction of opening a = +3 up
- b) zeros 4, -2
- c) axis of symmetry $\frac{4 + (-2)}{2} = \frac{2}{2} = 1$ x = 1
- d) vertex (1, -27) $y = 3(1 - 4)(1 + 2)$
 $y = 3(-3)(3)$
 $y = -27$
- e) y-intercept (0, -24)

f) Sketch using the critical points.

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